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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SONG, MATTHEW J

ART UNIT

PAPER NUMBER

1765

7

DATE MAILED: 02/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-7

Office Action Summary	Application No. 09/728,193	Applicant(s) MORITA, ETSUO	
	Examiner Matthew J Song	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-24 is/are pending in the application.
- 4a) Of the above claim(s) 21 and 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2, 4-20 and 23-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 16-17 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 16 recites forming the first pattern by selective deposition of a masking material; the selective deposition of a masking material is not disclosed in the specification.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1-20 and 23-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-20 cites a "predetermined thickness" in line 3 of claim 1, "predetermined" is indefinite, likewise for claims 23-24. The examiner suggests deleting "predetermined".

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2. Claims 11-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 11-20 cites a "predetermined base" in line 5 of claim 11, "predetermined" is indefinite.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1,2, 4, 7, 11-20 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pribat et al (US 4,952,526).

Pribat et al discloses a wafer **1** made of GaAs or InP (claim 14), this reads on applicant's basal body, depositing a dielectric thin layer **2** of silicon nitride or silica (claim 12-13), where excellent deposition selectivity can be obtained between GaAs and a silicon nitride film by plasma assisted CVD (claim 16-17) (col 10, ln 1-35) with a thickness between 5×10^{-2} and a few micrometers, etching a set of bands **23,24** (claim 2 and 7) on the dielectric using means known to those skilled in the art such as photolithography or wet or dry chemical attack (col 4, ln 50-60), where the bands **23,24** have a width of 0.5 to a few microns and being spaced out at distances of some microns to several hundred microns, thus periodically baring the substrate (col 10, ln 50-67

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and col 11, ln 1-10 and Figs 23-24). Pribat et al also discloses a deposition of a thin film of III-V compound is deposited on the preceding structure by MOCVD, with a thickness of a few hundred angstroms to a few microns and depositing a second layer of dielectric, with a thickness of a few hundred angstroms to a few micrometers (col 11, ln 11-38 and Fig 26). Pribat et al also discloses apertures are etched in a second layer of the dielectric and the apertures are offset with respect to the previous ones and the offset can vary from some micrometers to some hundreds of micrometers, this reads on applicant's forming patterns at least partly overlies one another and at least partly do not overlies one another. Pribat et al also discloses III-V polycrystalline material is removed by chemical attack through the apertures, this reads on applicant's forming an indentation (claim 16-19) so as to bare the monocrystalline seed through the apertures and growing a thin layer of monocrystalline III-V material between the dielectric layers and the upper dielectric is removed throughout the surface of the wafer so as to obtain a monocrystalline thin layer of semiconductor (claim 17) (col 11, ln 39-67 and Fig 27). Pribat et al also discloses repeating the disclosed method to obtain a stacking shown in Fig 14 (claims 16-19) (col 12, ln 1-25 and Figs 22-31). Pribat et al discloses a base layer **32** in Fig 31 (claims 11 and 16-19). Pribat et al also discloses a first pattern of dielectric material **50** and **51** with different lengths than a second pattern of dielectric material **20** and **21** in Fig 19.

Pribat et al does not teach the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pribat et al to obtain a different pitch between pattern elements of one and

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another pattern element by optimizing the pitch of each pattern element by conducting routine experiments of a result effective variable as recognized by the art.

Referring to claim 4, Pribat et al teaches optimizing the pitch of each pattern element, this inherently would satisfy the relationship of claim 4.

3. Claims 1,2, 4, 7, 11-15 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuda et al (US 6,294,440).

Tsuda et al discloses a GaN layer **101**, this reads on applicant's base layer, is grown to a thickness of about 4 micrometers on a sapphire substrate **100** (claim 14) is placed in a growth chamber and a first patterned mask made of SiO₂ (claim 12-13) is formed on the GaN layer **101** by sputtering (claim 15) and the SiO₂ film is patterned to a periodic strip with a width of about 7 micrometers and a pitch of about 10 micrometers by conventional photolithography method, whereby a first SiO₂ mask **102** is formed (col 7, ln 20-45). Tsuda et al also discloses a GaN crystal film **103** is grown by Metal organic vapor phase epitaxy (MOVPE) to a thickness of about 3 micrometers and a forming a second mask on the GaN film **103**. Tsuda et al also discloses the second mask film **104** is a SiO₂ film with a thickness of about 200 nm with a periodic strip pattern (claim 2 and 7) with a width of about 8 micrometers and a pitch of about 10 micrometers is formed by a photolithography method and forming a GaN single crystal film **105** thereon by MOVPE (col 7, ln 46-67 and col 8, ln 1-30 and Fig 1). Tsuda et al also discloses it is important to select a relationship between the size of each opening of the first mask and the stripe width of the second mask, depending upon required characteristics of a light-emitting device, this reads on applicant's pitch of pattern elements (col 8, ln 31-65). Tsuda et al also

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discloses a semiconductor substrate including a sapphire substrate can also be used as a substrate, where a sapphire substrate may be peeled off from a semiconductor structure by grinding or etching and the remaining structure can be used as a substrate (claims 20 and 24) (col 22, ln 2-60).

Tsuda et al discloses it is important to select a relationship between the size of each opening of the first mask (claim 6) and the stripe width of the second mask, depending upon required characteristics of a light-emitting device, this reads on applicant's pitch of pattern elements (col 8, ln 31-65). Tsuda et al does not disclose the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tsuda et al to obtain a different pitch between pattern elements of one and another pattern element by optimizing the pitch of each pattern element by conducting routine experiments of a result effective variable as recognized by the art.

Referring to claim 4, Tsuda et al teaches optimizing the pitch of each pattern element, this inherently would satisfy the relationship of claim 4.

Referring to claim 11, Tsuda et al discloses a method of forming layer **101**, the examiner interprets this to read on applicant's predetermined base layer, a first pattern formation **102**, a first growth step **103**, second pattern **104** and second growth step **105**.

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4. Claims 1, 4-6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pribat et al (US 4,952,526) or Tsuda et al (US 6,294,440) in view of Fleming et al (US 6,358,854).

Pribat et al or Tsuda et al teaches all of the limitations of claim 1, as discussed previously above, except the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.

In a method of layered material compositions, Fleming et al teaches a first structured layer **204** comprises a planar pattern of spacer bars **202** of a first material, silica, and rods **205**, of a second material, polysilicon, (col 7, ln 1-67) and the first and second material can be selected from III-V semiconductors (col 8, ln 60-67 and col 9, ln 1-20) and features which make a structured layer need not be rectangular bars arranged parallel to each other, but can take on nearly any shape, size (claim 6) and orientation and the size, spacing and separation of elements, this reads on applicant's pitch, making up the structured layers can also vary between layers (col 10, ln 1-30 and col 11, ln 1-10). Fleming et al also discloses a first layer includes a continuous hexagonal distribution of first material, this reads on applicant's two directions (claim 8), the voids of the array being filled with a second material (col 11, ln 11-30 and Fig 6) and a conventional two-dimensional photonic lattice is implemented with a single structural layer (claim 8), the two-dimensional structure within that layer giving the desired optical properties. (col 12, ln 1-35). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pribat et al or Tsuda et al with Fleming's varying pitch between layers to change the optical properties.

Response to Arguments

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5. Applicant's arguments filed 12/6/2002 have been fully considered but they are not persuasive.

In response to applicant's argument that the 112 first paragraph should be withdrawn because the instant specification discloses the claimed feature at page 8, lines 21-24, but this has not been found persuasive. Claim 16 and 17 recites "selective deposition of a masking material to form a first pattern", but the instant specification fails to provide support for this limitation. The instant specification discloses a layer of silicon dioxide or silicon nitride deposited by for example, sputtering on the surface of the base crystal layer 12, after which the layer is patterned using photolithography and dry etching, for example to form a first mask pattern 13 on page 8, lines 21-24. However, the deposition of the silicon dioxide is not selective. The deposited layer does not form in selective areas of the substrate, the layer forms over the entire area. The masking layer is formed by selective etching using photolithography. The instant specification does not support depositing the masking layer in a selective manner.

Applicant's argument that the word "predetermined" is not indefinite has been considered, but has not been found persuasive. The term "predetermined" does not have a defined value or range for the thickness of the crystal, therefore is indefinite.

In response to applicant's argument that the Pribat reference fails to teach or suggest a first pitch of patterns is different from a second pitch of patterns (pg 11) has been considered but has not been found persuasive. Applicant has referred to Figs 27-29 of the Pribat reference and other embodiments where the material appears to have the same pitch. However, in another embodiment of the Pribat reference, Fig 19, Pribat et al teaches different lengths of dielectric and different spacing. It would have been obvious to a person of ordinary skill in the art at the time of

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the invention to use another embodiment of Pribat et al. Also the Fleming reference teaches the size, spacing and separation of elements, this reads on pitch, making up the structured layers can also vary between layers (col 10, ln 1-30 and col 11, ln 1-10), therefore it would have been obvious to a person of ordinary skill in the art at the time of the invention to vary the pitch between the layers to change the optical properties.

In response to applicant's argument that Tsuda et al does not teach first pitch of patterns is different from a second pitch of patterns has been considered but has not been found persuasive. Tsuda et al teaches it is important to select the relationship between the size of each opening of the first mask and the stripe width of the second mask, depending upon the required characteristics of a light emitting device (col 8, ln 50-55), therefore the pitch is a result effective variable, which can optimized by routine experimentation resulting in different pitches.

In response to applicant's argument that Pribat et al or Tsuda et al does not teach the claimed relationship of claim 4 has been considered but has not been found persuasive.

Applicant's state that Pribat et al and Tsuda et al are silent a relationship with respect to a difference in pitch between the pattern elements of the first and second plurality of patterns as defined by claim 4. However, Tsuda teaches the size and spacing of each layer effects the characteristics of the device, which is a teaching of the pitch is a result effective variable, therefore it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tsuda et al by optimizing the pitch of each layer by conducting routine experimentation of a result effective variable to obtain the relationship of claim 4. Evidence supporting an unexpected result from the relationship of claim 4 is required to overcome an obvious optimization of a result effective variable, which is not provided.

In response to applicant's argument that the recited relationship of claim 4 is not taught by Pribat et al, Tsuda et al and Fleming et al is noted but has not been found to be persuasive. The pitch of each layer has been taught by the prior art to be a result effective variable. Therefore, the relationship of claim 4 would have been obvious to one of ordinary skill at the time of the art by optimizing the pitch of each layer by conducting routine experimentation of a result effective variable.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS
February 13, 2003


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
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